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IDENTIFICATION OF CORAL REEF CONDITIONS IN SUNGAI CUKA VILLAGE, KINTAP DISTRICT OF TANAH LAUT REGENCY, SOUTH KALIMANTAN PROVINCE OF INDONESIA

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South Kalimantan, Indonesia*E-mail: ftony@ulm.ac.id**ABSTRACT**

Tanah Laut Regency has a very strategic potential in tourism development in South Kalimantan Province, so it is deemed necessary to conduct underwater research with the aim of identifying coral reef types, knowing the condition of coral cover and knowing the physical and chemical conditions of the waters of the Sungai Cuka Village, Kintap District. Coral reef ecosystems around the waters of Sungai Cuka village, Kintap District only found 1 type of Acropora coral lifeform, namely Acropora tabulate (ACT), and 4 Non-Acropora species namely Coral branching (CB), Coral massive (CM), Coral encrusting (CE), Coral foliose (CF), Coral reef cover range survival ranged from 1.88% to 46.38%. Therefore, the condition of coral reefs around the sea waters of Sungai Cuka Village, Kintap District ranges from low to fair based on coral reef assessment criteria according to Indonesia Environment Minister's Decree, No. 4/2011. Almost all water quality parameters measured: temperature, brightness, current speed, salinity, pH and DO are still within the tolerance limits of water quality standards, except for brightness which is below the quality standard threshold, which is between 3 - 3.5 meters and salinity which ranges from 35 - 40 above the quality standard threshold based on the Indonesia Minister of Environment Decree No. 51/2004.

KEY WORDS

Coral reef, Sungai Cuka village, Tanah Laut regency, South Kalimantan province.

Tanah Laut Regency has a very strategic potential in tourism development in South Kalimantan Province, one of which is the potential for underwater tourism which was recently discovered by the Potential Excavation Team of the Tanah Laut Regency Tourism Office in collaboration with a team of divers from the Faculty of Fisheries and Marine Affairs, Lambung Mangkurat University in in 2019 in Sungai Cuka Village, Kintap District, Tanah Laut Regency. From the initial identification, several coral reef spots were found at coordinates S 03° 52' 55.7"-E 115° 25' 25.2" with the name Batu Buaya and coordinates S 03° 52' 20.6"-E 115° 23' 51.3" named Batu Gagak. Reef fish are important communities in coral reef ecosystems because of their trophic relationship with other biotic components (Tony. F, et al 2021, Rifa'i, 2016; Rifa'i, et al, 2016, Iskandar. R, et al 2020)

Based on Law Number 23 of 2014 concerning Regional Government and Regional Regulation Number 13 of 2018 concerning the division of water zoning in South Kalimantan, it is stated that from the coastline to 12 miles the management of marine spatial planning is the authority of the South Kalimantan Provincial government. Meanwhile, based on Law no. 10 of 2009 concerning tourism, requires that tourism development in districts/cities refers to

national, regional and local interests. The main ideas are based on local interests, namely related that regional tourism development planning must reflect regional autonomy, through efforts to optimize the utilization of regional potential and resources. In addition, regional tourism development must also pay attention to the preservation of nature and the environment diversity of reef fish in the sea waters of Sungai Cuka Village, Kintap District, Tanah Laut Regency, South Kalimantan. The role of the government is very important in managing the utilization of coastal potential and empowering coastal village communities to support the development of diversifying their business (Hidayat A. S., and Agusliani, E., 2020).

On the basis of these considerations, as well as referring to the tourism potential to dig deeper related to the underwater potential found in Sungai village. It is deemed necessary to conduct research on Identification of Reef Conditions in SungaiCuka Village, Kintap District, Tanah Laut Regency, South Kalimantan Province with the aim of identifying coral reef types, knowing the condition of coral cover and knowing the physical and chemical conditions of water in the Sea waters of Sungai Cuka Village, Kintap District.

METHODS OF RESEARCH

The material of this research is coral reefs in the waters of SungaiCuka Village, Kintap District, South Kalimantan Province with several environmental parameter data including bioecological aspects consisting of live coral cover and coral lifeforms, physical aspects consisting of Temperature ($^{\circ}\text{C}$), Brightness (m), Current (m/s) and chemical aspects involved. consists of Salinity (‰), Degree of Acidity (pH) and Dissolved Oxygen (DO). As a brief description of the observation points, it can be seen in Figure 1 below:

Figure 1 – Research Location Map

The research method in collecting data on coral reefs uses the Line Intercept Transect (LIT) method based on English et al, (1997). Reef fish data was collected using the Underwater Visual Census (UVC) method (English et al, 1994).

Determination of Research Stations and Parameters. Determination of the research station point is done by purposive sampling technique. The technique is based on the consideration that the selected location can represent the waters of the marine waters of Sungai Cuka Village, Kec. Kintap. Coral community data collection consisted of 4 stations which were determined purposively. By being marked using the help of GPS (Global Position System). Each station consists of 2 (two) transects while for water quality parameters taken at these stations.

Table 1 – Research Station Coordinates

Description	Station (ST) 1	Station (ST) 2	Station (ST) 3	Station (ST) 4
Coordinates	03°52'37,6" 115°23'33,3"	03°52'33,5" 115°23'42,0"	03°53'40,6" 115°21'39,2"	03°53'30,6" 115°21'32,0"

The percentage of live coral cover, dead coral and other lifeform types is calculated using the formula (English et. al., 1997):

$$C = \frac{\alpha}{A} \times 100\%$$

Where: C = Percentage of closing lifeform i; α = Lifeform transect length i; A = Total length of transect.

Assessment of coral reef ecosystems refers to the Minister of Environment Decree No. 4 in 2011.

Temperature and pH were measured with the same tool so that data were obtained at once, namely using a water quality checker, the method of collecting data before using the tool was calibrated first. Temperature and pH were measured above the water surface at each predetermined station. Insert the tool into the surface of the water and record the data for each parameter that is read on the screen.

Water brightness data collection is carried out on the surface. The following are the steps for measuring the brightness of the waters:

- Dip the secchi disk into the water slowly until you don't see the black and white plates then record how deep the secchi disk goes into the water (H1);
- Try not to shake too much so that the secchi disk remains flat;
- Lift the secchi disk slowly until the black and white plate is visible then note how deep the secchi disk goes into the water (H2).

The measurement of brightness obtained by using the secchi disk (in meters) is processed to obtain the percentage value (%) of the brightness of the waters with the equation:

$$I = \frac{\left(\frac{H_1 + H_2}{2}\right)}{H_{tot}} \times 100\%$$

Where: I = water brightness (%); H1 = secchi disk depth to invisible (m); H2 = secchi disk depth when visible (m); H_{tot} = total water depth (m).

Current velocity is measured using a current kite. Following are the steps in measuring the current velocity:

1. Dip the kite stream into the water;
2. Turn on the timer just after the current kite enters the water;
3. Observe the current kite until it reaches the maximum rope length (5 meters);
4. After reaching the maximum limit, stop the timer and record the time.

To find out the value of the current velocity at each station, the following equation is used:

$$V = \frac{L}{p}$$

Where: V = current speed (m/s); L = length of the stretched rope (m); p = time taken until the rope is stretched (m).

Salinity is the amount of natural salt (grams) contained in one liter of seawater, usually expressed by per mille (‰) or per thousand which indicates how many grams of mineral content in every 1,000 grams of seawater. Salinity was measured using a refractometer. The water sample is dropped into the refractometer, then the instrument is directed towards the sun directly, a blue and white field will appear, the boundary line between the two fields that shows the salinity level. Record the salinity value.

Dissolve Oxygen (DO) is the level of oxygen in the water. The dissolved oxygen comes from the atmosphere directly which can then be utilized by aquatic biota. DO is also a benchmark to determine whether or not a water is good. The greater the DO value contained, the better the water quality. How to use the DO Meter is very easy, namely dip the pen on the DO meter into the water, and then the dissolved oxygen value will automatically be seen on the DO meter monitor.

RESULTS AND DISCUSSION

The results showed that there was 1 type of *Acropora* coral lifeform in the sea waters of SungaiCuka Village is *Acropora tabulate* (ACT), and 4 types of Non-*Acropora* namely Coral branching (CB), Coral massive (CM), Coral encrusting (CE), Coral foliose (CF), Coverage range of live coral reefs ranges from 1.88% up to 46.38%. Therefore, the condition of coral reefs around the waters of the village of Sungai Cuka Village, Kintap District ranged from low to fair.

Table 2 – Percentage of live coral cover in the waters of SungaiCuka Village –Kintap District

Station	1	2	3	4
Percentage (%)	46.38	41.14	14.14	1.88

At station 1, transect 1 and transect 2 no hard coral (*Acropora*) cover was found, while hard coral (Non *Acropora*) was found at 22.98% and 23.3%, respectively, while the hard coral category (Non *Acropora*) was found in each transect is Massive and Encrusting.

Figure 2 – Percentage of Coral Cover Station 1 transects 1 and 2.

The percentage of lifeform cover at Station 1 transect 1 found 6 species, namely Massive, Encrusting, DC with Algae, Halimidae, Sponge and Rubble, while at transect 2 found 5 species, namely Massive, Encrusting, DC with Algae, Sponge and Rubble.

Figure 3 – Percentage of Lifeform Coverage for Station 1 transects 1 and 2.

At station 2, the cover of hard coral (Acropora) namely Acropora tabulate (ACT) was only on transect 1, while hard coral (Non Acropora) were found to be 31.14% and 9.16%, respectively, namely Massive and Encrusting species.

Figure 4 – Percentage of Coral Cover Station 2 transects 1 and 2

The percentage of lifeform cover at Station 2 transect 1 found 9 species, namely Tabulate, Branching, Massive, Encrusting, Foliose, DC With Algae, Halimidae, Sponge and Sand, while on transect 2 found 5 species namely Foliose, DC With Algae, Halimidae, Sponge and Sands.

Figure 5 – Percentage of Lifeform Coverage for Station 2 transects 1 and 2

Figure 6 – Percentage of Coral Cover Station 3 transects 1 and 2

At station 3, transect 1 and transect 2 did not find hard coral (*Acropora*) cover while hard coral (Non *Acropora*) was only found on transect 1, namely Massive and Foliose with a cover percentage of 14.14%.

The percentage of lifeform cover at Station 3 transect 1 found 6 species, namely Massive, Foliose, DC With Algae, Halimidae, Sponge and Sand, while on transect 2 only 3 species were found, namely DC With Algae, Sponge and Sand.

Figure 7 – Percentage of Lifeform Cover Station 3 transects 1 and 2

Figure 8 – Percentage of Coral Cover Station 4 transects 1 and 2

Figure 9 – Percentage of Lifeform Coverage for Station 4 transects 1 and 2

At station 4, transect 1 and transect 2 did not find hard coral (*Acropora*) cover while hard coral (Non *Acropora*) was found on transect 2, namely Encrusting, with a cover percentage of 1.88%.

The percentage of lifeform cover at Station 4 transect 1 found 4 species, namely DC With Algae, Sponge, Others and Sand, while on transect 2 found 6 species, namely Encrusting, DC With Algae, Halimidae, Sponge, Others and Sand.

The results of the research on water quality parameters which are physical and chemical factors in the sea waters of Sungai Cuka Village, Kintap District can be seen in table 4 below:

Table 3 – Measurement results of water quality parameters

Parameters		Stations				Indonesia Environment Minister's Decree No. 51/2004
		1	2	3	4	
Sampling Time		14.14	16.20	15.20	14.15	
Physical Factor	Temperature (°C)	29	28	31	29	28 - 30 °C
	Brightness (m)	3.5	3.3	5.2	3	> 5
	Current (m/s)	0.05	0.08	0.10	0.08	
Chemical Factor	Salinity (‰)	35	35	40	40	33 - 34
	pH	6.26	7.97	8.04	8.01	7 – 8.5
	DO (mg/l)	6.4	7.8	5.9	5.8	> 5

From the results of research activities, it can be concluded that the coral reefs in the waters of Sungai Cuka Village, Kintap District is a type of fringing coral reef, because coral reefs in the research location can be found along the coast with water depths not too far leading to the open sea which can be found at a depth of less than 8 meters. This is in line with the Nybakken (1988) which states that the Fringing Reef is a coral reef that is found along the coast and is not more than 40 meters deep. These reefs grow to the surface and towards the open sea. At the research location which is in the waters of Sungai Cuka Village, Kintap District, the average coral reef at this location is generally found to be sloping average at each station. At a depth of more than 8 meters, corals are rarely found; this is because the substrate of sand mixed with mud seems to dominate at the study site. In the sea waters of Sungai Cuka Village, Kintap District is known that the percentage of live coral cover is 46.38% which is in the fair category. The types of corals encountered were Coral Massive and Coral Encrusting.

Table 4 – Percentage of live coral cover in the waters of Sungai Cuka village, Kintap District

Station	1	2	3	4
Percentage (%)	46.38	4.14	14.14	1.88
Category	Fair	Fair	Low	Low

Table 5 – Coral Reef Assessment Criteria according to Indonesia Environment Minister's Decree No. 4/2011

Category	Lifeform Coverage (%)
Very good	75 – 100
Well	50 – 74.9
Fair	25 – 49.9
Low	0 – 24.9

Hard coral cover as an indicator of coral reef health looks low at each station, so the coral reefs are in Low condition. Coral reefs are strongly dominated by soft coral communities, hard corals generally from the Massive coral group and the growth of Halimeda algae. Other biota from the sponge group associated with other reefs is often seen reaching 71%. According to Gomez & Alcala (1982) the presence of algae will become competitors for corals so that corals are difficult to survive.

The low coral cover is also influenced by water quality including salinity which has exceeded the quality standard threshold based on the Indonesia Environment Minister's

Decree No. 51/2004 with a salinity tolerance of 33-34‰, while at the time of data collection in all stations it ranged between 35-40‰ while parameters such as temperature, pH and DO are still within the tolerance threshold of the quality standard. In addition, the brightness parameter is also very decisive on coral growth. Sedimentation or deposition that occurs due to various kinds of human activities such as mining, construction along the coast, logging of tropical forests, or agriculture. These activities result in soil erosion that is carried to the sea. Where the research location is in the waters of Sungai Cuka Village, Kintap District is right at the mouth of the Cuka river, as a result the level of turbidity of the water can also lead to higher and threaten the life of existing coral reefs because the water quality is dirty and cloudy, this can be seen in the data obtained that the brightness parameter only reaches 3 - 3.5 meters, only at station 3 which has a brightness of 5.2 meters. It can be concluded that the lower the level of brightness of a waters, it will be able to disrupt the growth of corals.

The average current velocity is 0.07 m/s with the highest value at station 3 being 0.10 m/s in Table 6. The current velocity value in Table 12 shows results greater than the current velocity in the coastal waters of Angsana Regency. Soil seasoning between 0.01 - 0.05 m/s with an average of 0.03 m/s (Iskandar & Tony, 2013). Currents play a role in the growth process to supply food in the form of plankton, oxygen and are needed in the cleaning process of materials stuck in coral polyps (Dahuri, 2003). So, the condition of the corals will be better if they are in areas with moderate currents because they do not make the corals break easily and help clean the material on the corals. In addition, currents are also able to reduce sedimentation that covers the coral surface. Based on the data above, the range of current velocity also affects the growth of coral reefs. This is in line with the condition of clam coral cover in the Kima reef waters area in the village of Bunati district, Angsana Regency. Ground seasoning with fair to good category (Jainudin, et al, 2015), while in the research area it is categorized as low to fair.

The abundance of algae living on coral reefs is not a good indication. Algae that grow because of the amount of pollution that occur makes the condition of coral reefs gradually die. Moreover, if the algae-eating fish are caught in excess, it is certain that the algae will grow rapidly because the algae-eating fish are decreasing. All stations in the research location were found with Halimidae Algae. The dominance of soft coral cover and algae causes space competition with hard corals and inhibits the coral recruitment process by preventing the attachment of larvae and the development of coral seedlings (Loya et al., 2004). Hard corals and soft corals are important benthic reef communities, both of which often coexist as sessile benthic species that compete with each other for space. The dominance of soft corals is benefited by waters with high nutrient waves and fairly strong currents and low temperatures, which occur regularly and continuously (Rustam et al., 2016).

CONCLUSION

Coral reef ecosystems around the waters of Sungai Cuka village, Kintap District only found 1 type of Acropora coral lifeform, namely Acropora tabulate (ACT), and 4 Non-Acropora species namely Coral branching (CB), Coral massive (CM), Coral encrusting (CE), Coral foliose (CF), Coral reef cover range life ranged from low to fair.

Almost all water quality parameters measured are: temperature, brightness, current speed, salinity, pH and DO are still within the tolerance limits of water quality standards, except for brightness which is below the quality standard threshold and salinity is above the quality standard threshold based on Indonesia Environment Minister's Decree No 51/2004.

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